



# Gambling preference and individual equity option returns<sup>☆</sup>



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## ABSTRACT

We investigate the relation between the option returns and the underlying stock's lottery-like characteristics. Call options written on the most lottery-like stocks underperform otherwise similar call options written on the least lottery-like stocks by 10–20% per month. Moreover, the more lottery-like the underlying stocks, the further and more frequently the options deviate from the put–call parity in the direction induced by overvalued calls. Furthermore, the lottery-like characteristic effect is stronger during periods of high investor sentiment. The results suggest that optimism-induced gambling preference causes lottery-like options to be overvalued.

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## 1. Introduction

The financial economics literature has explored investors' preference for a lottery-like asset, or an asset with a low probability of an extremely high payoff. Studies such as [Arditti \(1967\)](#) and [Scott and Horvath \(1980\)](#) use the standard expected utility framework to show that risk-averse investors exhibit a preference for lottery-like features—specifically, skewness—in asset return distributions.<sup>1</sup> They predict that the skewness preference

commands a negative risk premium on positively skewed securities. More recently, [Brunnermeier, Gollier, and Parker \(2007\)](#) and [Barberis and Huang \(2008\)](#) develop behavioral models of preferences in which investors overestimate the probability that an extreme positive payoff will realize, resulting in an overvalued security with a potentially high payoff.

This paper investigates the pricing implications of the preference for a lottery-like asset in the individual equity options market. While the effect of gambling preference on the stock market has been examined widely (see, e.g., [Bali, Cakici, and Whitelaw, 2011](#); [Boyer, Mitton, and Vorkink, 2010](#); [Conrad, Dittmar, and Ghysels, 2013](#); [Conrad, Kapadia, and Xing, 2014](#); [Eraker and Ready, 2015](#); [Green and Hwang, 2012](#); [Mitton and Vorkink, 2007](#)), its impact on the options market has received less attention.<sup>2</sup> We

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<sup>1</sup> They show that non-satiated risk-averse investors prefer skewness when the risk aversion displays the attribute of decreasing with the wealth level ([Arditti, 1967](#)) or when investors are strictly consistent in their preference direction for the third moment ([Scott and Horvath, 1980](#)).

<sup>2</sup> [Boyer and Vorkink \(2014\)](#) and [Blau, Bowles, and Whitby \(2016\)](#) are notable exceptions.

focus on the options market because options are more attractive financial instruments for gambling than are stocks. The nonlinear payoff structure of an option contract and its implicit leverage amplify the lottery-like features of the underlying stock, creating a more dramatic lottery-like return distribution.<sup>3</sup> If lottery-preferring investors do recognize and capitalize on options' enhanced lottery-like characteristics, the gambling preferences should significantly influence the options market.<sup>4</sup> On the other hand, if retail investors, who are more likely to display a gambling preference, do not participate in the options market as much as they do in the stock market, possibly because they feel uncomfortable with the seemingly complicated structure of options, their limited participation would make the gambling preference effect less significant in the options market.<sup>5</sup> Given these competing views, an investigation of the impacts of the gambling preference on the options market seems worthwhile.

Our empirical investigation suggests that investors pay substantial premiums for the lottery-like characteristics of individual stock options. We find that call options written on the more lottery-like stocks are overpriced relative to otherwise similar call options written on the less lottery-like stocks. Specifically, we select for each stock the call option closest to at-the-money (ATM) and with a constant short-term maturity and then form the portfolios of the options based on lottery-like characteristics of their underlying stocks, measured by extreme positive value or skewness of return distribution. Our selection of short-term ATM calls ensures that the portfolios consist of the most liquid option contracts and that the options have the same contractual features across portfolios. We find that a zero-cost strategy of buying calls on the least lottery-like stocks and selling calls on the most lottery-like stocks yields statistically and economically significant returns of about 10% to 20% per month. We also analyze both cross-sectional and pooled regressions at the individual option level and confirm that the lottery-like characteristic has a significantly negative impact on the option returns after accounting for a variety of control variables.

Additionally, we examine whether the violations of the put-call parity are systematically related to the stocks' lottery-like features. We find that options written on the more lottery-like stocks deviate from the put-call parity in the direction induced by overvalued calls more frequently and with greater magnitude than options written on the less lottery-like stocks. This finding suggests that the

preferences for lottery-like assets generate upward price pressure for lottery-like call options, causing their prices to deviate from the value dictated by underlying stock prices. Consistent with the "price pressure" explanation, we also find that the overvaluation is stronger for lottery-like call options with high trading volume.

Having established that investors overpay for options with lottery-like characteristics, we next examine whether the overvaluation of lottery-like options is attributable to investor sentiment—investors' propensity to speculate or investor optimism. We use the investor sentiment index constructed by Baker and Wurgler (2006) to identify high- and low-sentiment periods and then analyze the option pricing impact of lottery-like characteristics within both periods. We find that the overpricing of lottery-like options is generally more pronounced during high-sentiment periods than during low-sentiment periods. This finding suggests that the overvaluation of lottery-like options is partially driven by investor sentiment and adds to the growing literature that indicates the critical role played by investor sentiment in financial markets.<sup>6</sup>

The two empirical papers on the implications of gambling preferences for the stock options market most closely related to ours are Blau, Bowles, and Whitby (2016) and Boyer and Vorkink (2014). The former suggests that investors exhibit a preference for options with lottery potential by showing that call options written on more lottery-like stocks have higher trading volume. They focus on the quantity dimension, or volume, of option trading in examining the impact of gambling preferences. Our analysis of option prices helps complete the picture.

Boyer and Vorkink (2014) construct an ex ante skewness measure for option returns by assuming a lognormal distribution of stock prices and use the measure to suggest a negative relation between options' lottery-like characteristics and returns. However, their option skewness measure does not capture the option's lottery-like characteristics caused by the underlying stock's lottery-like characteristics. Due to the lognormal simplification of stock price distribution, their option skewness measure is a function of only the underlying asset's expected return and volatility for given values of the option moneyness and the time to maturity. Their proxy does not consider the underlying asset's lottery-like characteristics such as skewness, which is arguably an important determinant of the option's lottery-like characteristics. Consequently, they say little about how the option's price is affected by the lottery-like characteristics inherited from the underlying stock, since they focus on the moneyness-driven lottery-like characteristics of options at the contract level. We complement their study

<sup>3</sup> For example, Boyer and Vorkink (2014) report that skewness in call option return distribution ranges from 0 to 25, while skewness in stock return distribution ranges from zero to three.

<sup>4</sup> Gao and Lin (2015) report substitution between lottery participation and option trading, implying that investors' craving for gambling activities is one important reason for trading options.

<sup>5</sup> Conrad, Kapadia, and Xing (2014) show that the effect of gambling preference is much stronger for stocks held primarily by less sophisticated retail investors than for those held by institutions. Campbell (2006) provides evidence that retail investors avoid using financial products that are complex or unfamiliar. Ofek, Richardson, and Whitelaw (2004) argue that the stock and options markets are segmented such that marginal investors across these markets are different and the options markets are "more rational" than are the equity markets through an analysis of the put-call parity relation.

<sup>6</sup> De Long, Shleifer, Summers, and Waldmann (1990) and Shleifer and Vishny (1997) provide seminal models in which investor sentiment plays a role in financial markets. Hirshleifer (2001) surveys the behavioral approach to asset pricing. Many empirical studies show that sentiment has an important influence on various financial markets: aggregate stock market (Brown and Cliff, 2005; Fisher and Statman, 2003; Tetlock, 2007); individual stock markets (Baker and Wurgler, 2006; Kumar and Lee, 2006; Neal and Wheatley, 1998); mutual fund markets (Lee, Shleifer, and Thaler, 1991); initial public offering (IPO) markets (Cornelli, Goldreich, and Ljungqvist, 2006; Ljungqvist, Nanda, and Singh, 2006); and option markets (Goyal and Saretto, 2009; Poteshman, 2001; Stein, 1989).

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